



Zoo Interchange Traffic Management Plan

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## PERFORMANCE MANAGEMENT REPORT

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January 2017

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U.S. Department of Transportation  
**Federal Highway Administration**



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# INsummary

## TRAFFIC MANAGEMENT PLAN (TMP) PROJECT GOALS

The Zoo Interchange Reconstruction Project team has developed goals to minimize disruption, delay, and driver frustration. These goals include improving key alternate routes to maximize traffic diversion from the freeway, minimize crashes in the work zone, and achieve a system-wide delay of 15 minutes or less per vehicle. Below is a summary of the TMP's performance.

## TRAFFIC VOLUME INFORMATION

- In order to maintain acceptable delay (15 minutes or less), 20-30% diversion from the freeway is needed.
- The long-term lane closure on I-41/894 NB was reopened on November 1, 2016, resulting in increased volumes on I-41/894 NB at Lincoln Avenue (22% increase compared to October 2016). The average November 2016 volumes for I-41 NB at North Avenue also increased by 6% compared to the October 2016.
- After the restoration of three lanes on I-41/894 NB at Lincoln Avenue, more people switched back to the freeway instead of taking alternate routes. The average November 2016 volumes for WIS 100 NB at Greenfield Avenue decreased by 18% compared to October 2016.
- The average November 2016 volumes on WIS 100 SB at Greenfield Avenue increased by 7% compared to October 2016. Most of the increase occurred between noon and 7 p.m.

## CRASH DATA

- The national average for crashes in a work zone increase by 20-25%.
- The number of crashes in September 2016 on I-94 EB between 124th Street and Hawley Road increased by 62% compared to the August 2016. Fifteen out of twenty-one crashes occurred on I-94 EB east of the Zoo Interchange.
- As I-41 NB was reduced to two lanes between Bluemound Road and Watertown Plank Road for 10 days, the number of crashes in September 2016 on I-41 NB between I-94 and North Avenue was almost tripled compared to August 2016.
- The number of crashes in September 2016 on I-41 SB between North Avenue and I-94 increased by 55% compared to August 2016. Ten out of seventeen crashes were rear-end crashes.

## ARTERIAL TRAVEL TIMES

- The October 2016 travel time on the WIS 100 corridor is not available due to a Bluetooth sensor outage on WIS 100 and Theo Trecker Way. The October 2016 travel time for WIS 100 SB from Capitol Drive to I-94 was 14 minutes and 32 seconds (three minutes and 47 seconds longer than September 2016).
- The November 2016 travel time on WIS 100 NB between National Avenue and Capitol Drive was improved compared to September 2016 data (almost two minutes shorter). This shorter travel time was due to lower volumes on WIS 100 NB after the removal of the long-term lane closure on I-41/894 NB at National Avenue.
- The November 2016 travel time on WIS 100 SB between Capitol Drive and National Avenue was almost three minutes longer compared to September 2016 data because WIS 100 SB was utilized as a major detour for the Zoo Interchange N-E system ramp closure.

## WEBSITE STATISTICS

- The number of visits to the website in November 2016 decreased by 70% compared to October 2016.
- The number of total page views in November 2016 decreased by 65% compared to October 2016.

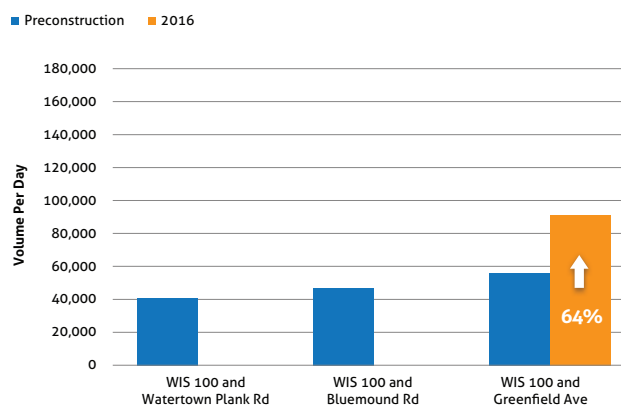
## FREEWAY SERVICE TEAM (FST)

- October and November 2016 data is not available.

# INsummary

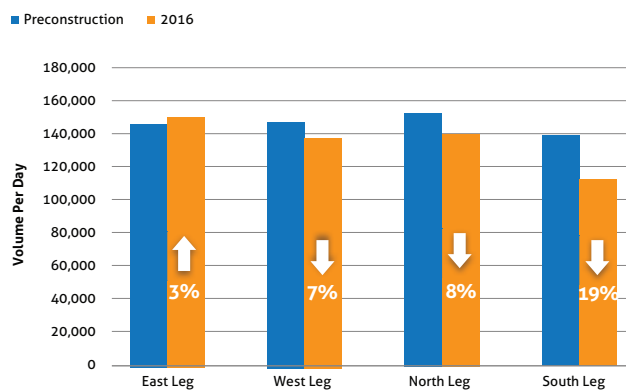
- 2016 preliminary crash data was recently updated on December 10, 2016.
- I-41 NB was reduced to two lanes between Bluemound Road and Watertown Plank Road from September 7-16, 2016. The lane coming from the Zoo Interchange E-N became an exit only lane to Watertown Plank Road.
- Zoo Interchange N-E system ramp (I-41 SB ramp to I-94 EB) was closed beginning Saturday, October 1, 2016.
- I-41/894 NB traffic was restored to three lanes at National Avenue beginning Tuesday, November 1, 2016. The Zoo Interchange S-E system ramp decision point shifted to Greenfield Avenue and the S-W system ramp switched to a right-hand exit. The following were reopened: the National Avenue entrance ramp to I-41/894 NB; the Greenfield Avenue entrance ramp to the Zoo Interchange S-E ramp (to I-94 EB); the WIS 100 entrance ramp to I-43.
- I-41/894 SB traffic was switched to the NB roadway between Greenfield Avenue and Lincoln Avenue on Saturday, November 12, 2016. The Greenfield Avenue entrance ramp to I-41/894 SB was closed. Also, the I-41/894 SB off-ramp to Greenfield Avenue and Lincoln Avenue were both closed.
- There was a firmware upgrade on September 26, 2016, that changed how vehicles are being counted in the InSync signal system for the intersections of WIS 100 and Bluemound Road and WIS 100 and Watertown Plank Road. Arterial volume data is not available for these two intersections for the months of October 2016 and November 2016.
- Volume and travel time data for November 2016 was from the first three weeks of November (excluding the week of and the week after the Thanksgiving holiday).

## Average Weekday Intersection Volume – November 2016\*

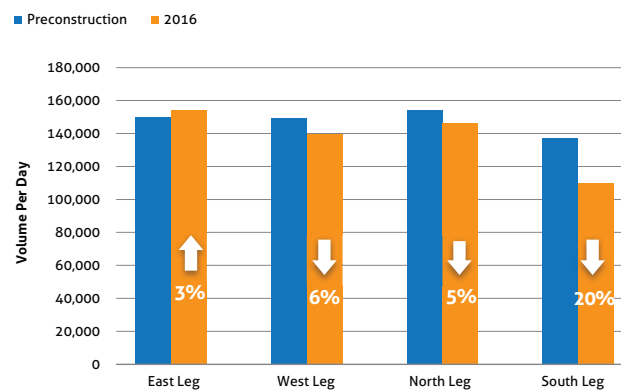


\* Intersection volume only accounts for through and left-turn movements. Right-turn movements are excluded, except for east-west movement on WIS 100 and Greenfield Avenue.

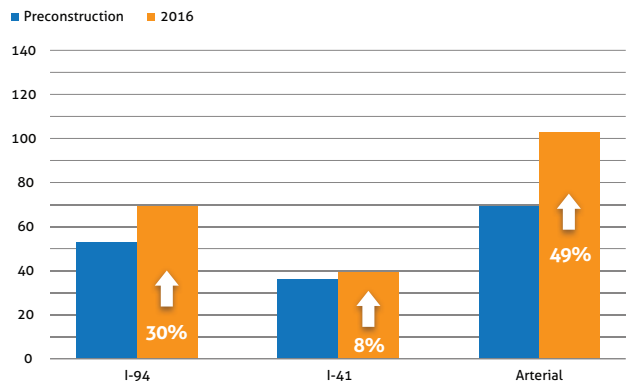
## Average Weekday Freeway Volume – November 2016



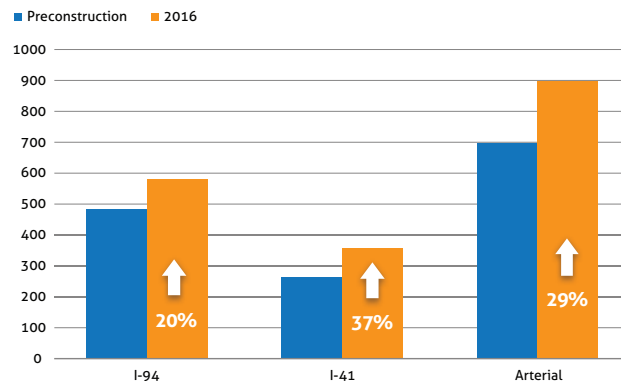
## Average Weekday Freeway Volume – Year-to-Date (Jan-Nov 2016)



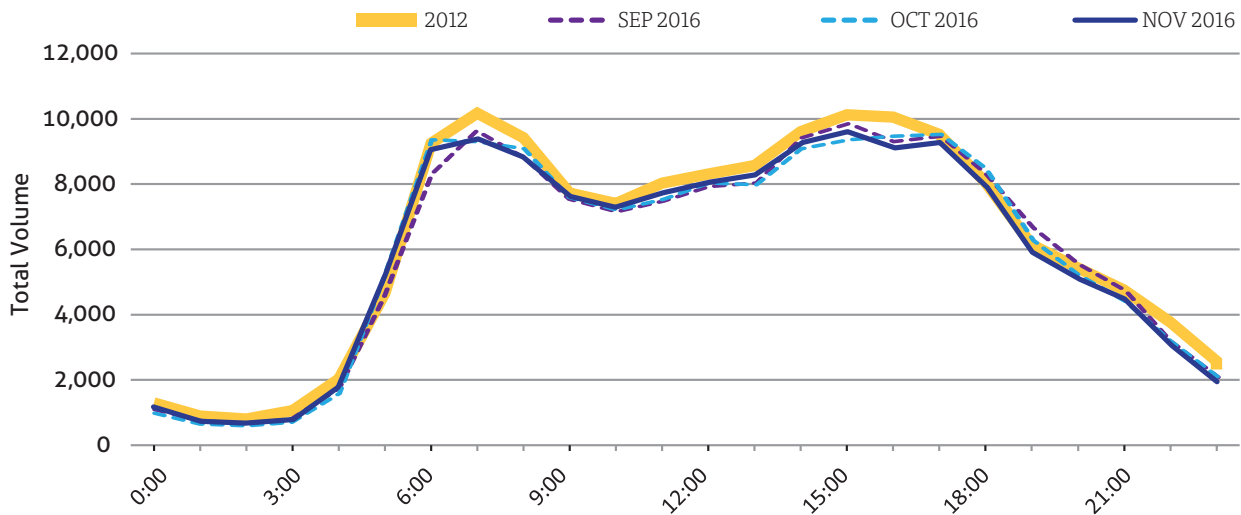
## Total Crashes – September 2016



## Total Crashes – Year-to-Date (Jan-Sep 2016)

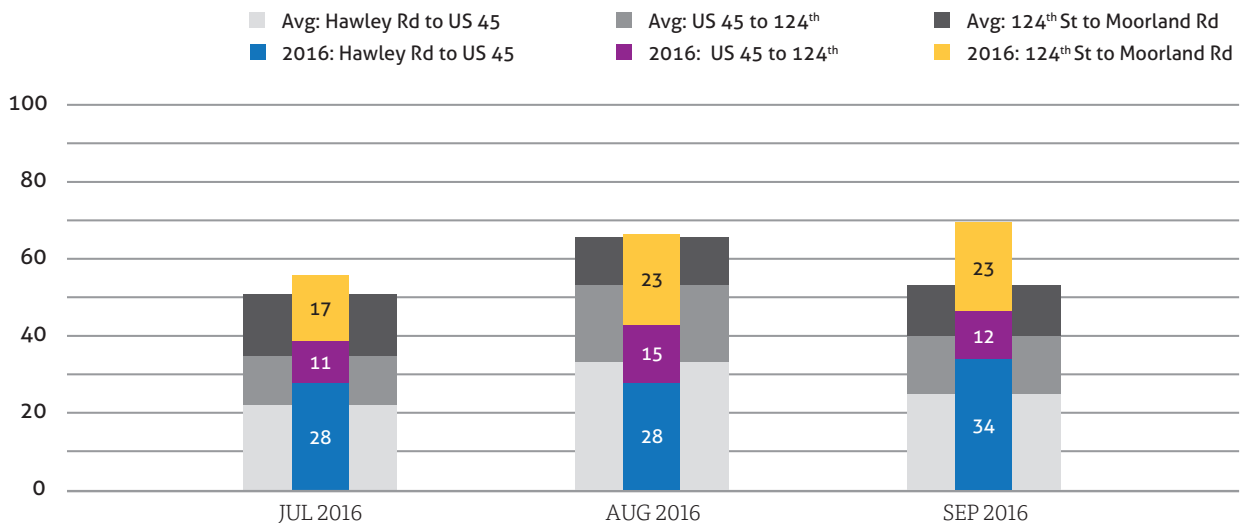


## I-94 VOLUME APPROACHING THE ZOO INTERCHANGE (NOVEMBER 2016)<sup>1</sup>



1. Volumes are an average of weekday volumes (Tuesday through Thursday).

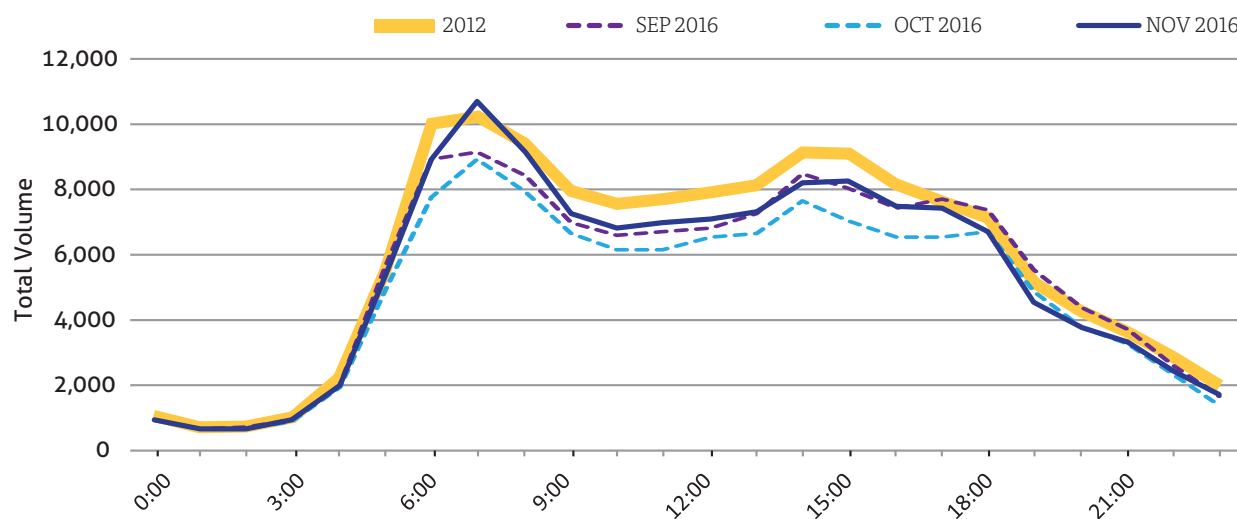
## I-94 CRASHES (SEPTEMBER 2016)<sup>2</sup>



2. "Avg" = average of crashes between 2011 and 2013.

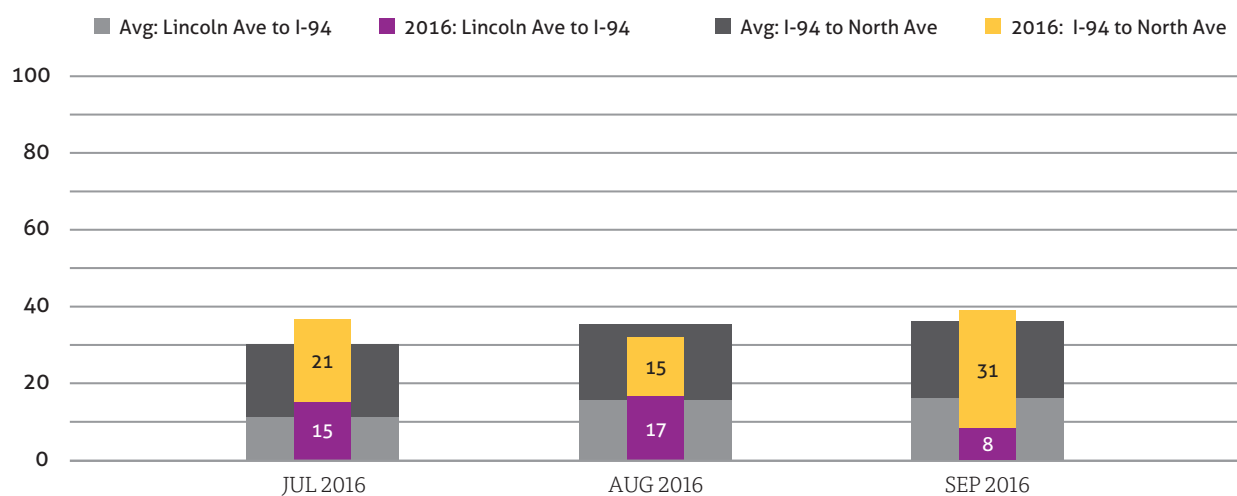
# INsummary

## I-41 / I-894 VOLUME APPROACHING THE ZOO INTERCHANGE (NOVEMBER 2016)<sup>1</sup>



1. Volumes are an average of weekday volumes (Tuesday through Thursday).

## I-41 CRASHES (SEPTEMBER 2016)<sup>2</sup>



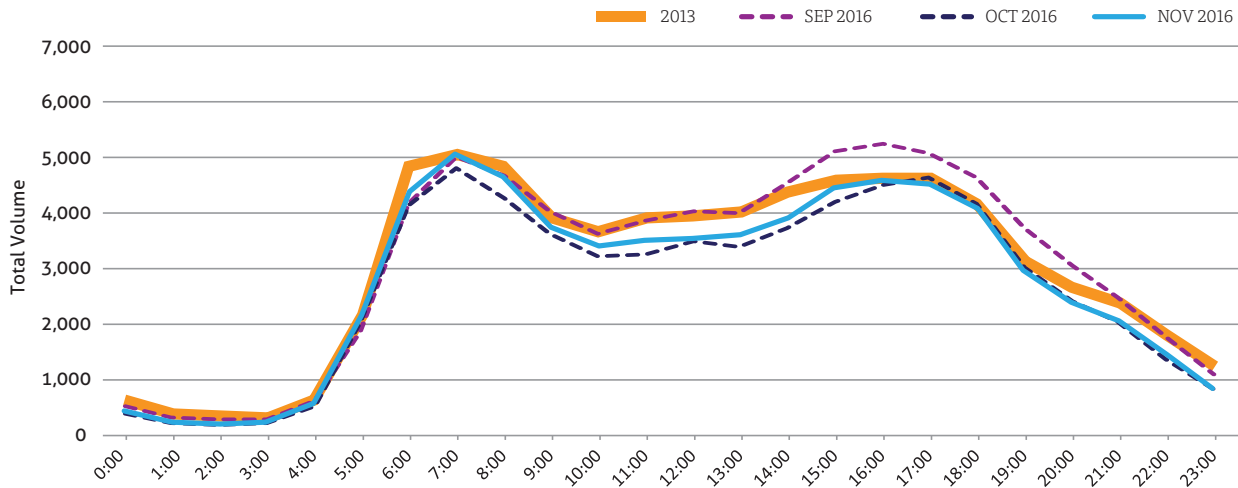
2. "Avg" = average of crashes between 2011 and 2013.

## NOTES:

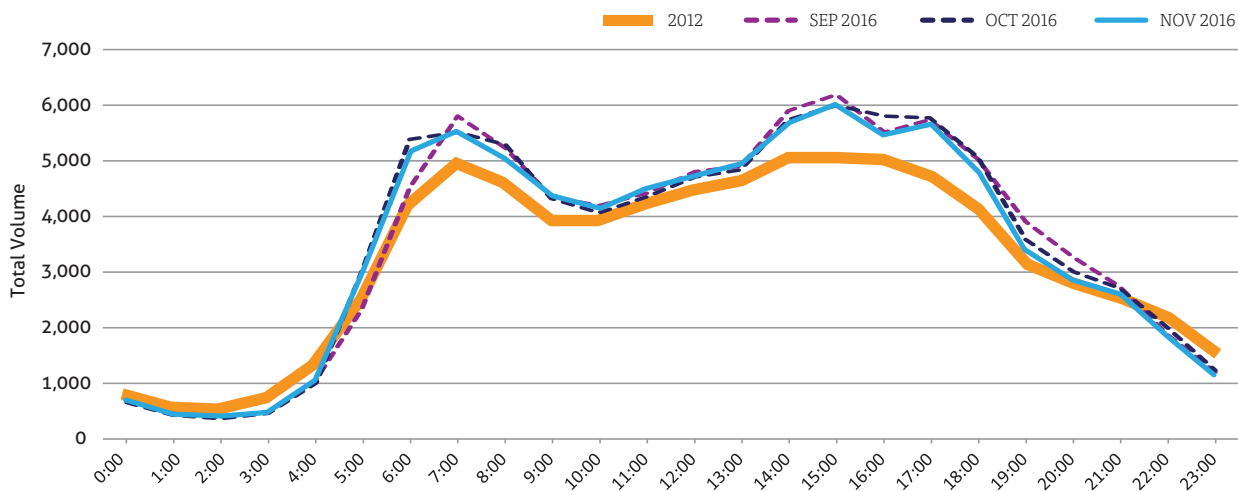
- Volumes are for average weekdays and exclude holidays and special events.
- I-94 EB pre-construction volume is from 2013, due to East-West reconstruction project on I-94 EB in 2012.

## VOLUMES EAST OF THE ZOO INTERCHANGE

### I-94 EB AT HAWLEY ROAD (NOVEMBER 2016)



### I-94 WB AT HAWLEY ROAD (NOVEMBER 2016)

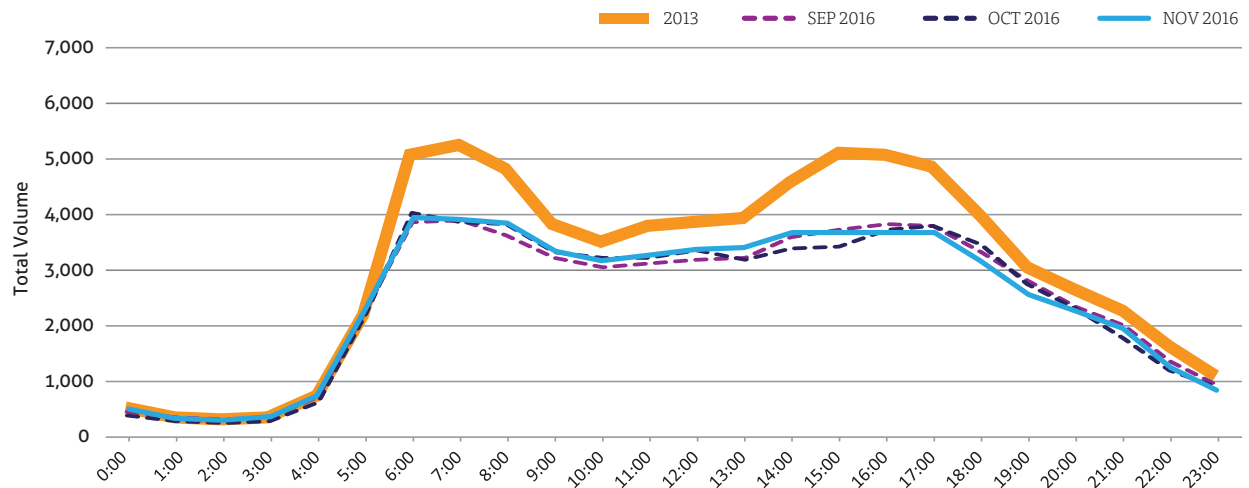


## NOTES:

- Volumes are for average weekdays and exclude holidays and special events.
- I-94 EB pre-construction volume is from 2013, due to East-West reconstruction project on I-94 EB in 2012.

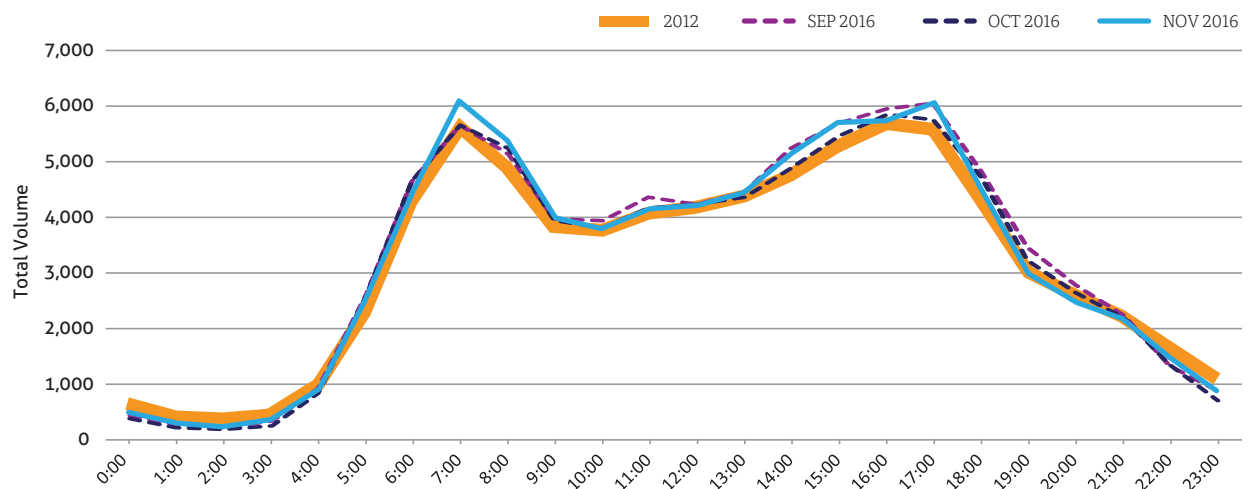
## VOLUMES WEST OF THE ZOO INTERCHANGE

### I-94 EB AT ELM GROVE ROAD (NOVEMBER 2016)<sup>1</sup>



1. I-94 EB was reduced to two lanes at Sunnyslope Road beginning on Saturday, March 12, 2016. It reopened on Tuesday morning, November 22, 2016. November data is from prior to the opening.

### I-94 WB AT ELM GROVE ROAD (NOVEMBER 2016)

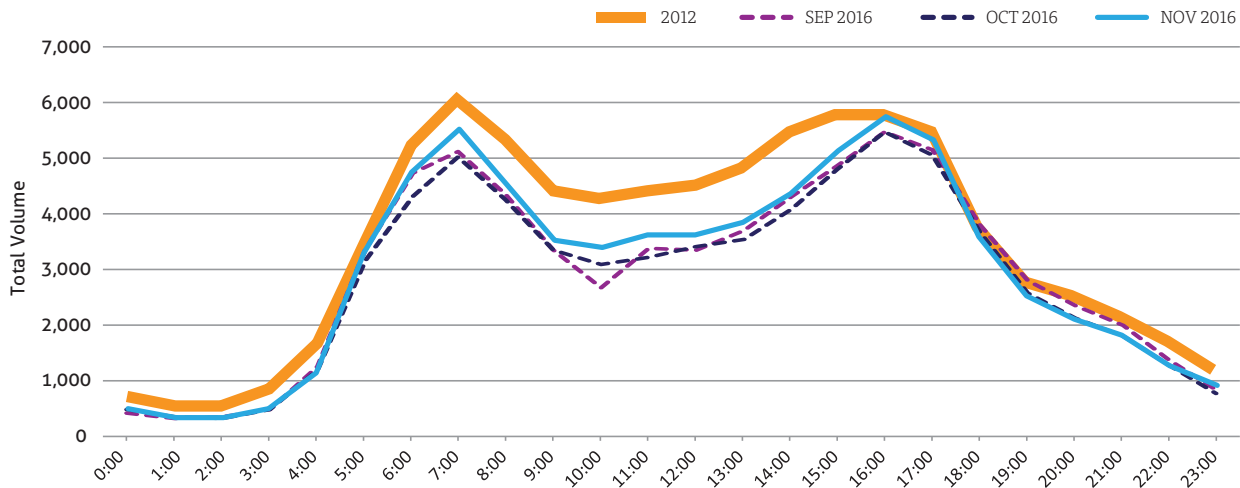


## NOTE:

- Volumes are for average weekdays and exclude holidays and special events.

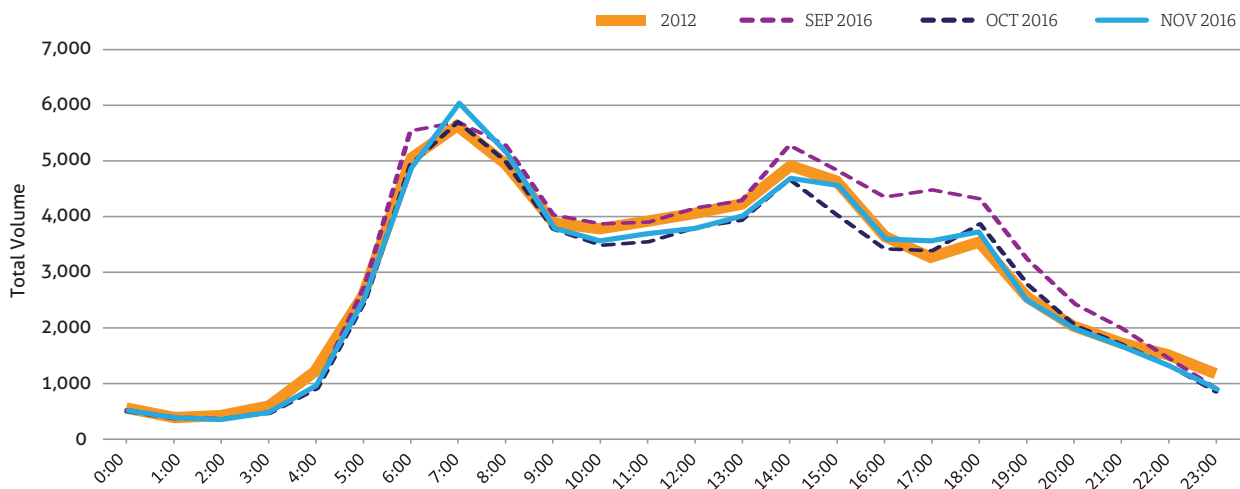
## VOLUMES NORTH OF THE ZOO INTERCHANGE

### I-41 NB AT NORTH AVENUE (NOVEMBER 2016)<sup>1</sup>



1. I-41 NB was reduced to two lanes between Bluemound Road and Watertown Plank Road from September 6-16, 2016.

### I-41 SB AT NORTH AVENUE (NOVEMBER 2016)

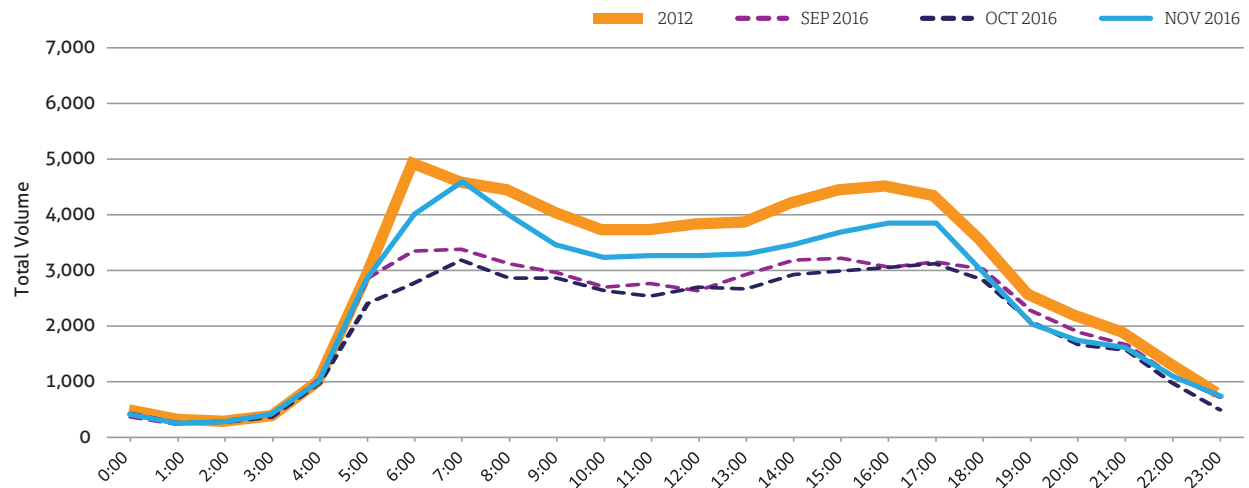


NOTE:

- Volumes are for average weekdays and exclude holidays and special events.

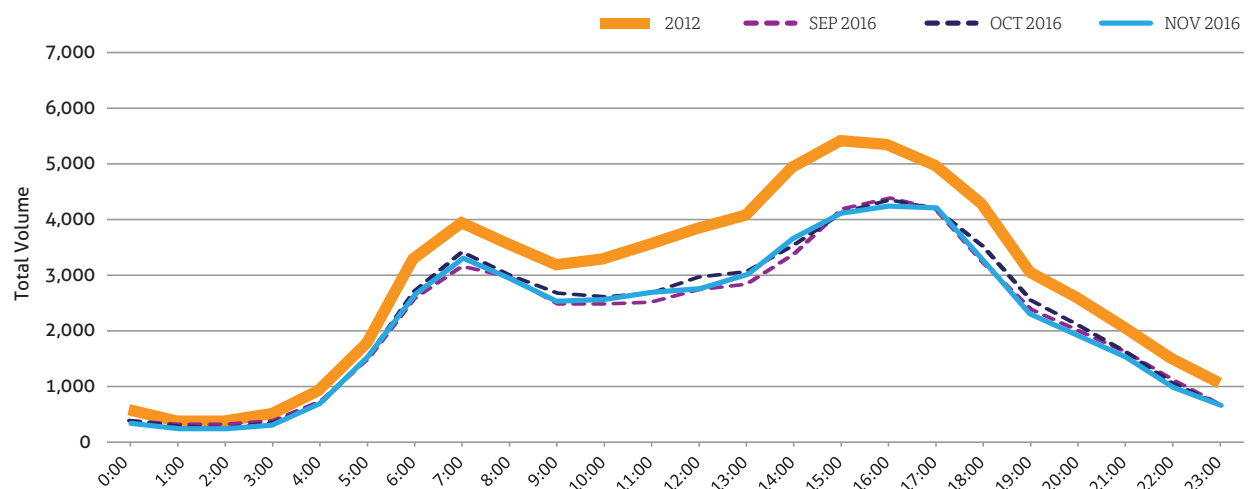
## VOLUMES SOUTH OF THE ZOO INTERCHANGE

### I-41 NB / I-894 WB AT LINCOLN AVENUE (NOVEMBER 2016)<sup>1</sup>



1. I-41 NB/I-894 WB was reduced to two lanes at National Avenue beginning on Saturday, April 16, 2016. It reopened on the morning of Tuesday, November 1, 2016. November data is after the opening.

### I-41 SB / I-894 EB AT NATIONAL AVENUE (NOVEMBER 2016)



## NOTES:

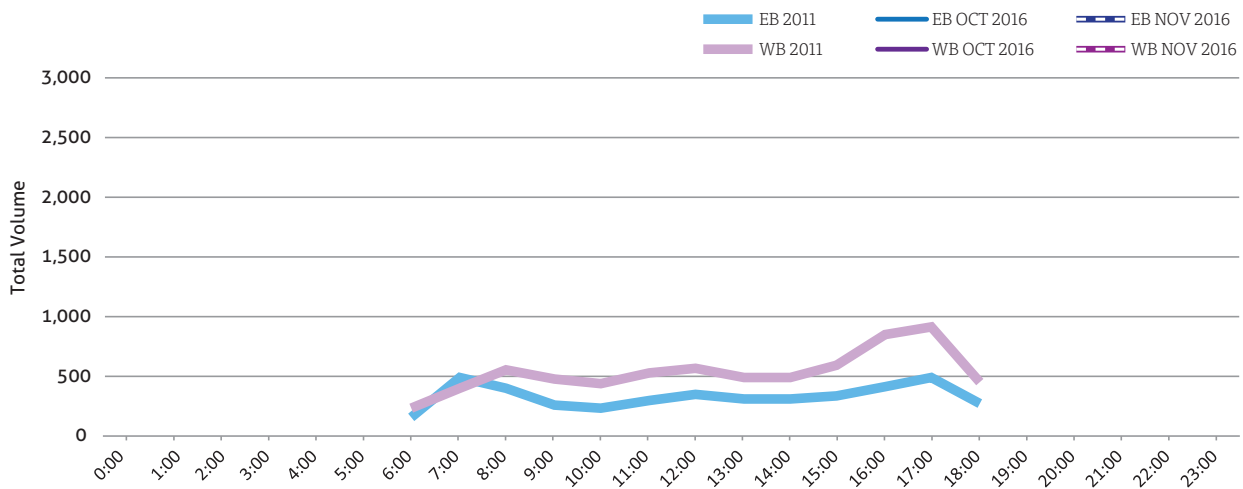
- Volumes were collected from InSync Adaptive Signal System, including only through and left-turn movements (right-turn movements are excluded).
- Volumes are an average of weekday volumes (Tuesday through Thursday).
- October and November 2016 data for WIS 100 and Watertown Plank Road intersection is not available due to a firmware upgrade to the intersection signal system.

## INTERSECTION VOLUMES ON ARTERIAL CORRIDORS

### WIS 100 AND WATERTOWN PLANK ROAD (NB AND SB)



### WIS 100 AND WATERTOWN PLANK ROAD (EB AND WB)

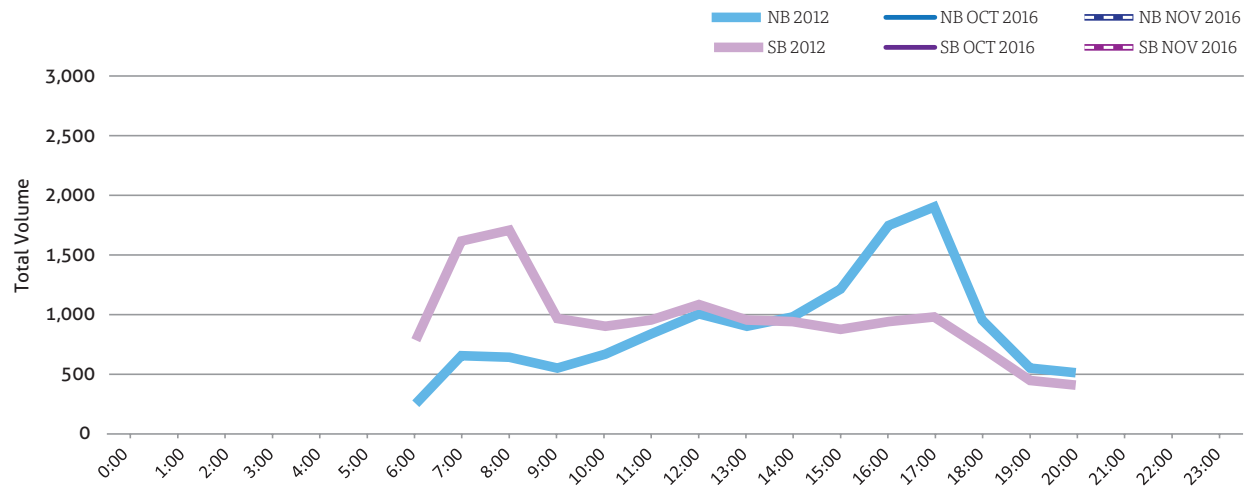


## NOTES:

- Volumes were collected from InSync Adaptive Signal System, including only through and left-turn movements (right-turn movements are excluded).
- Volumes are an average of weekday volumes (Tuesday through Thursday).
- October and November 2016 data for WIS 100 and Watertown Plank Road intersection is not available due to a firmware upgrade to the intersection signal system.

## INTERSECTION VOLUMES ON ARTERIAL CORRIDORS

### WIS 100 AND BLUEMOUND ROAD (NB AND SB)



### WIS 100 AND BLUEMOUND ROAD (EB AND WB)

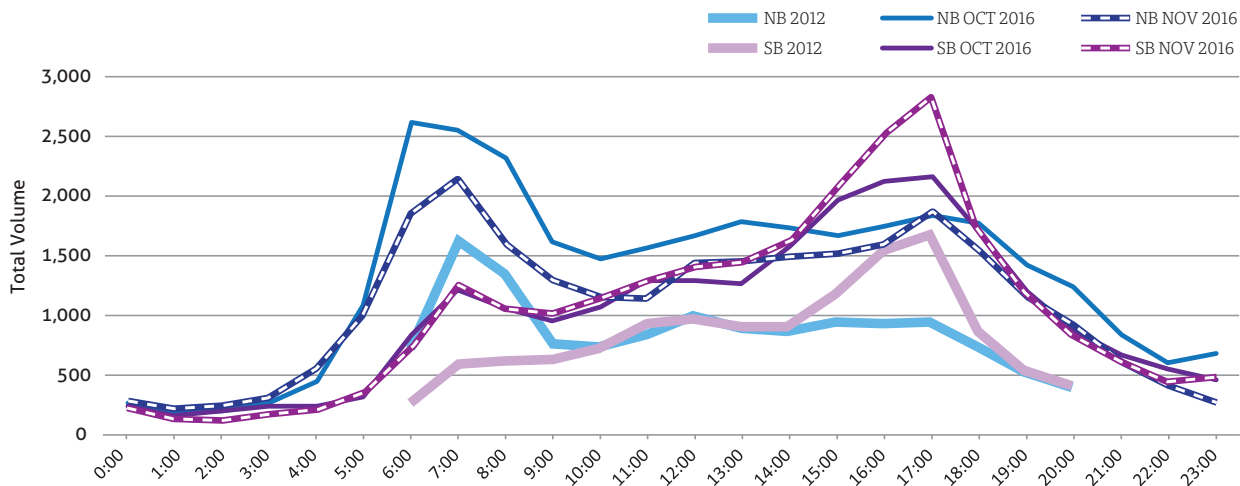


NOTES:

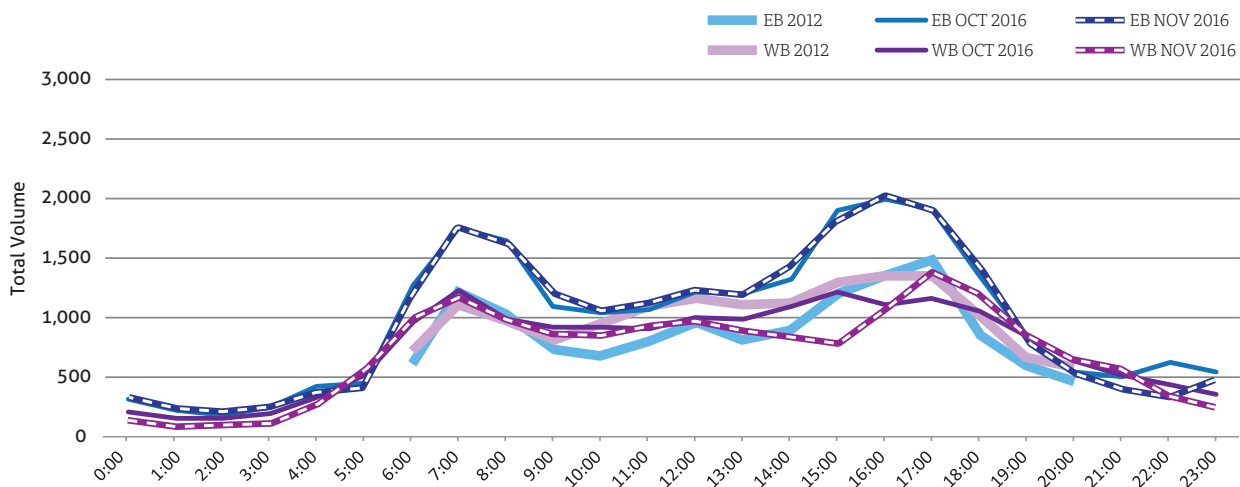
- Volumes were collected from InSync Adaptive Signal System.
- For this intersection, the northbound and southbound volumes exclude right-turn movements. The westbound and eastbound volumes include all movements (right-turn, through movements, and left-turn).
- Volumes are an average of weekday volumes (Tuesday through Thursday).

# INTERSECTION VOLUMES ON ARTERIAL CORRIDORS

## WIS 100 AND GREENFIELD AVENUE (NB AND SB)



## WIS 100 AND GREENFIELD AVENUE (EB AND WB)

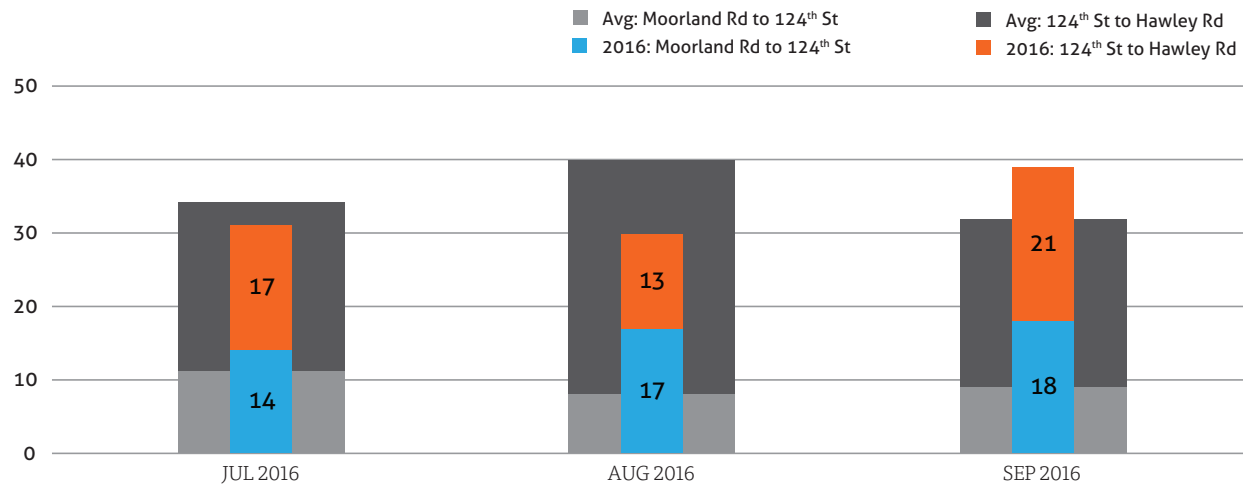


## NOTES:

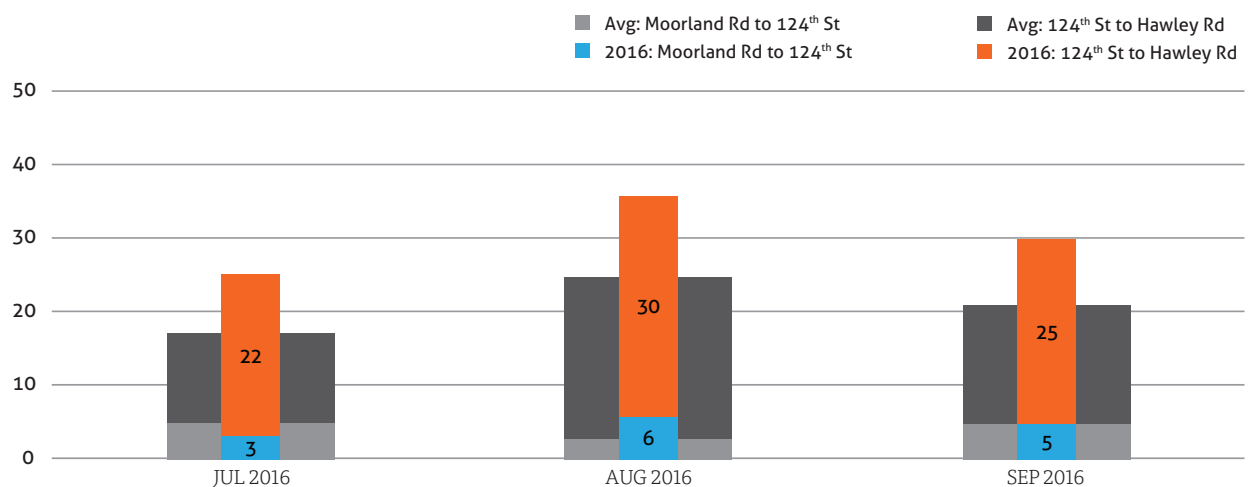
- 2016 preliminary data was updated on December 10, 2016.
- Crash data excludes deer crashes.
- Additional crashes may be added in the future as the database is updated.
- "Avg" = average of crashes between 2011 and 2013.

## CRASHES ON I-94 CORRIDOR

### I-94 EB (SEPTEMBER 2016)



### I-94 WB (SEPTEMBER 2016)

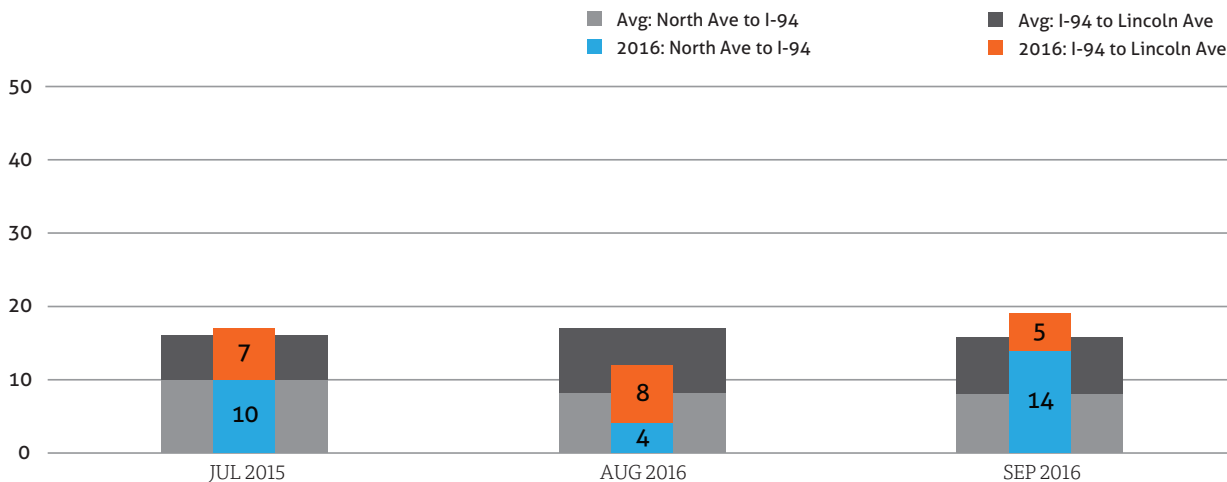


NOTES:

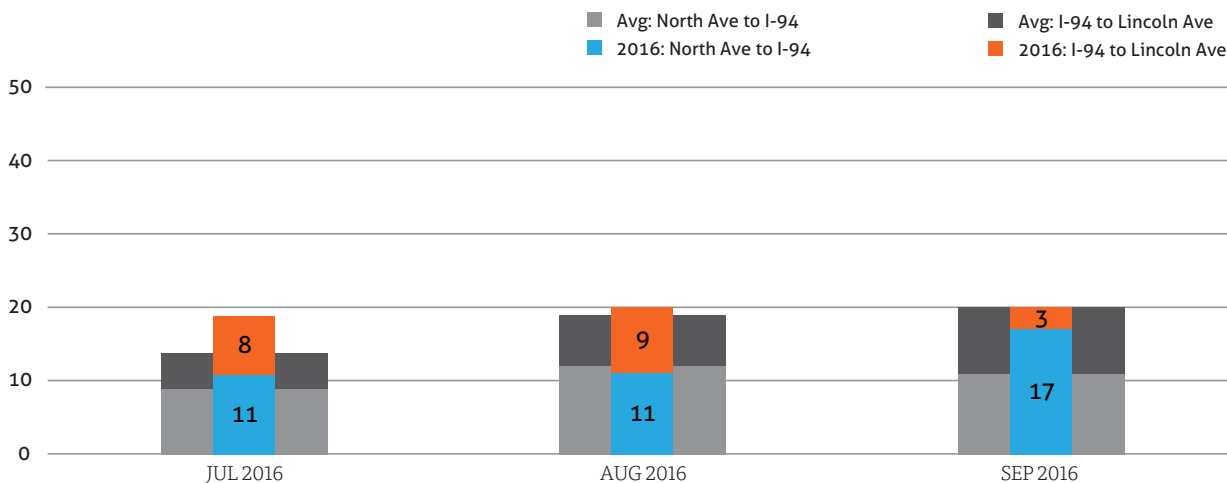
- 2016 preliminary data was updated on December 10, 2016.
- Crash data excludes deer crashes.
- Additional crashes may be added in the future as the database is updated.
- "Avg" = average of crashes between 2011 and 2013.

## CRASHES ON I-41 CORRIDOR

### I-41 NB/I-894 WB (SEPTEMBER 2016)



### I-41 SB/I-894 EB (SEPTEMBER 2016)

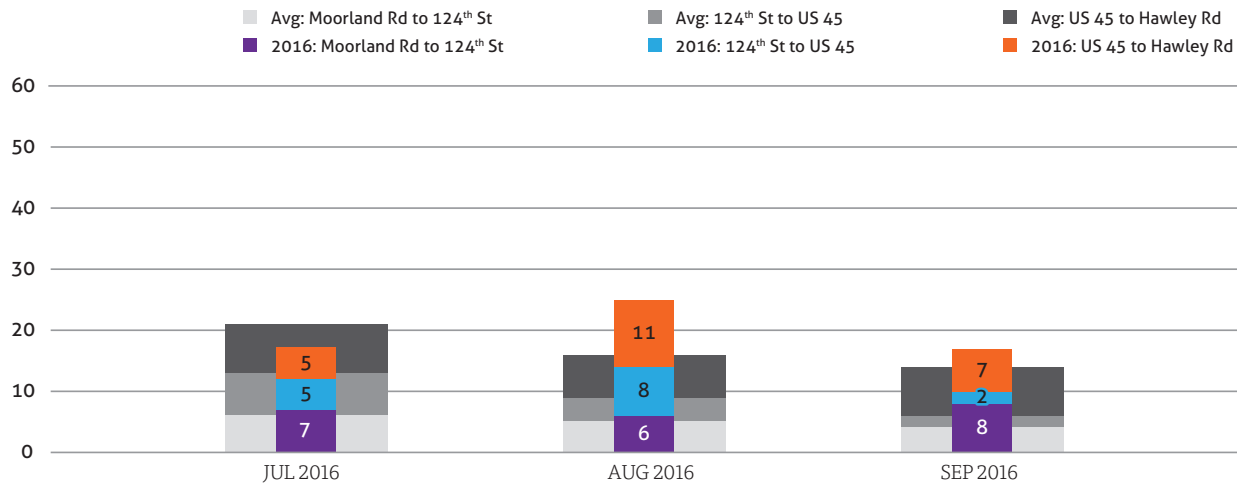


## NOTES:

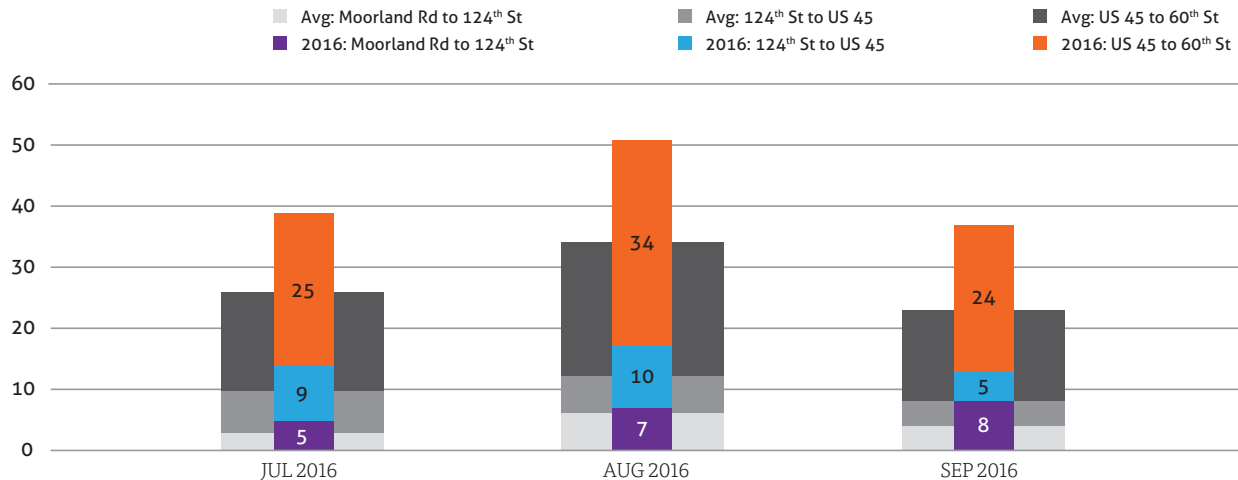
- 2016 preliminary data was updated on December 10, 2016.
- Crash data excludes deer crashes.
- Additional crashes may be added in the future as the database is updated.
- "Avg" = average of crashes between 2011 and 2013.
- Crashes that occurred at an intersection may be included in different corridors depending on the distance from the intersection.

## CRASHES ON ARTERIAL CORRIDORS

### BLUEMOUND ROAD CORRIDOR (SEPTEMBER 2016)



### GREENFIELD AVENUE CORRIDOR (SEPTEMBER 2016)

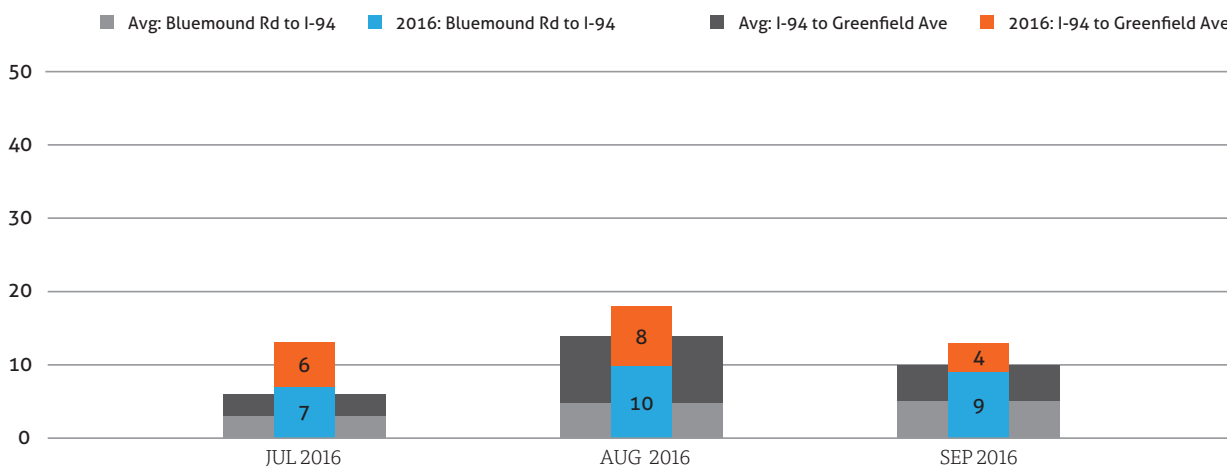


NOTES:

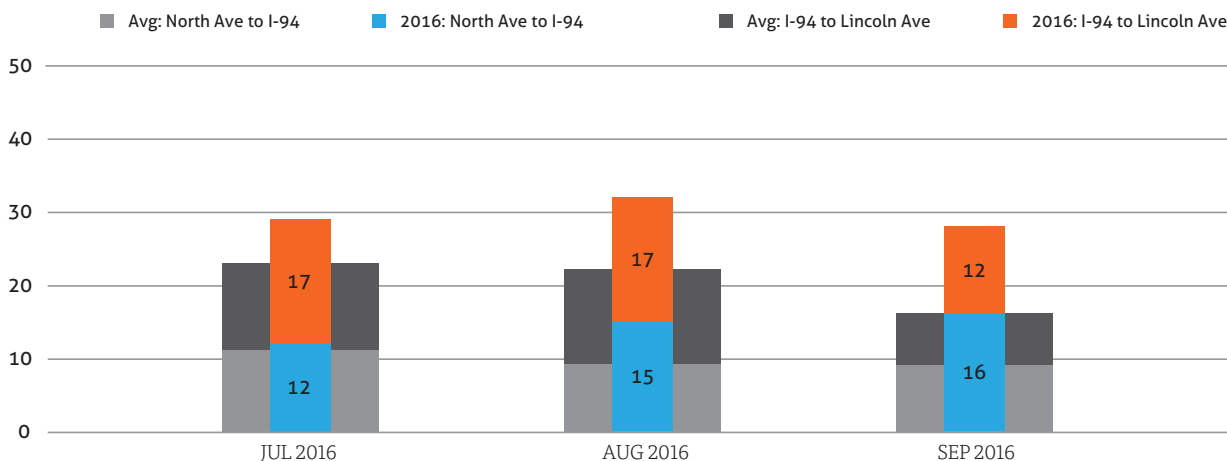
- 2016 preliminary data was updated on December 10, 2016.
- Crash data excludes deer crashes.
- Additional crashes may be added in the future as the database is updated.
- "Avg" = average of crashes between 2011 and 2013.
- Crashes that occurred at an intersection may be included in different corridors depending on the distance from the intersection.

## CRASHES ON ARTERIAL CORRIDORS

### MOORLAND ROAD CORRIDOR (SEPTEMBER 2016)



### WIS 100 CORRIDOR (SEPTEMBER 2016)

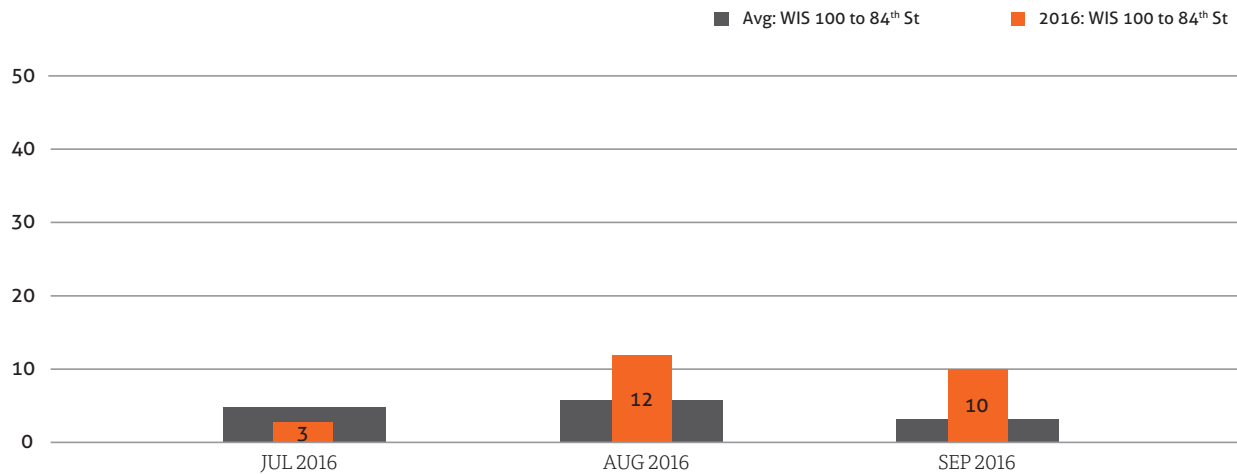


## NOTES:

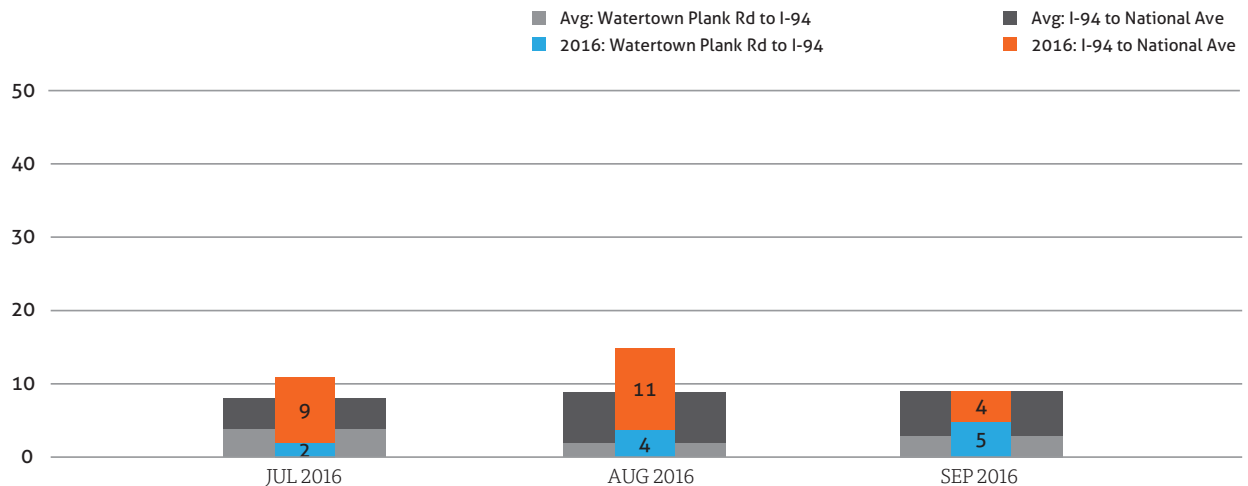
- 2016 preliminary data was updated on December 10, 2016.
- Crash data excludes deer crashes.
- Additional crashes may be added in the future as the database is updated.
- "Avg" = average of crashes between 2011 and 2013.
- Crashes that occurred at an intersection may be included in different corridors depending on the distance from the intersection.

## CRASHES ON ARTERIAL CORRIDORS

### WATERTOWN PLANK ROAD CORRIDOR (SEPTEMBER 2016)



### 84<sup>th</sup> STREET / WIS 181 CORRIDOR (SEPTEMBER 2016)

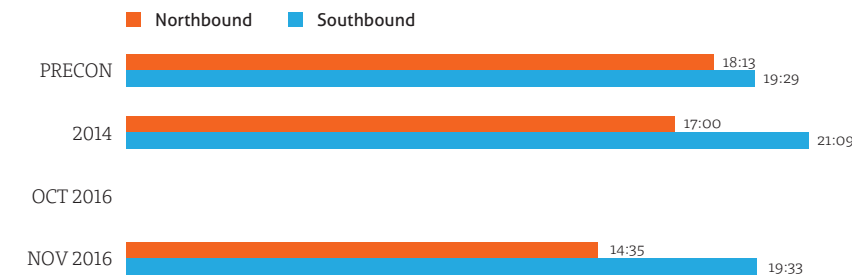


## NOTES:

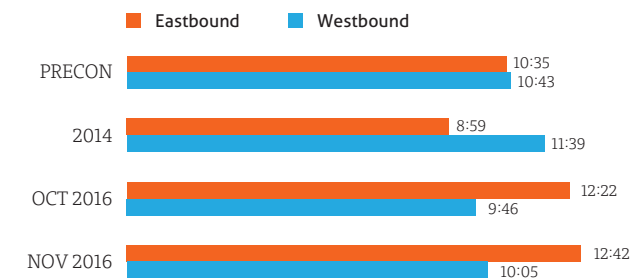
- All travel times are expressed in MM:SS format, where MM are minutes and SS are seconds.
- Travel time data is an average of Tuesday-Thursday travel time during p.m. peak hour (4:00 p.m.-6:00 p.m.).
- Travel time data during pre-construction and 2014 was collected through Manual Travel Time Run. Travel time for October 2016 and November 2016 was collected through Bluetooth detectors.
- October 2016 travel time data is not available for the WIS 100 corridor due to a Bluetooth sensor outage at WIS 100 and Theo Trecker Way.

## ARTERIAL TRAVEL TIMES

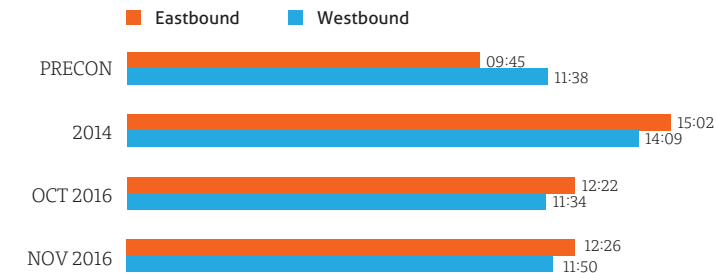
### WIS 100 CORRIDOR (CAPITOL DRIVE to NATIONAL AVENUE)



### BLUEMOUND ROAD CORRIDOR (MOORLAND ROAD to 84TH STREET/WIS 181)



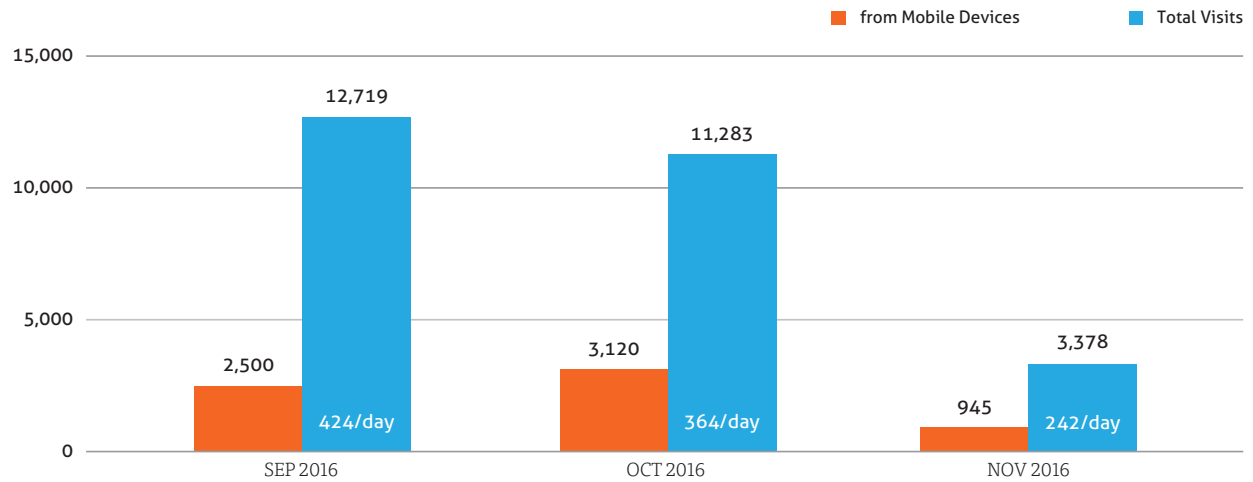
### GREENFIELD AVENUE CORRIDOR (MOORLAND ROAD to 84TH STREET/WIS 181)\*



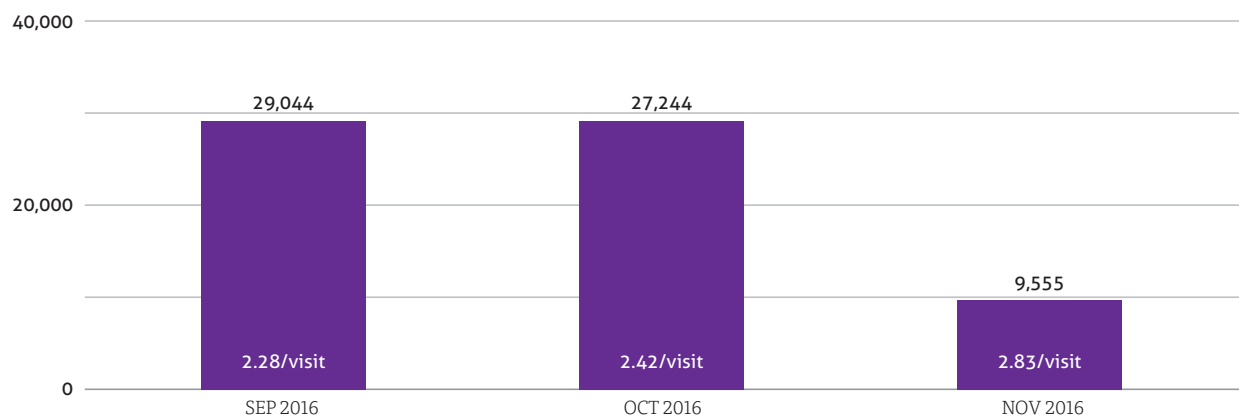
\* Travel time run on Greenfield Avenue corridor in 2014 was conducted before the Adaptive Signal System was installed.

## WEBSITE STATISTICS

### NUMBER OF VISITS BY MONTH

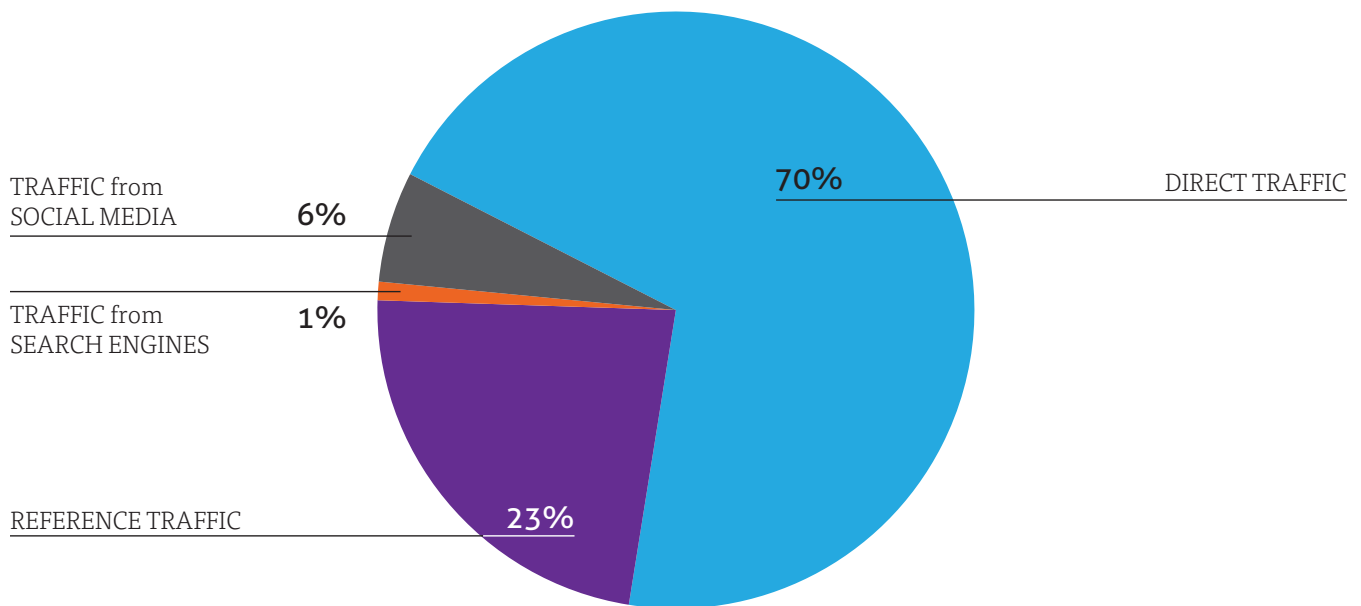


### TOTAL PAGE VIEWS BY MONTH



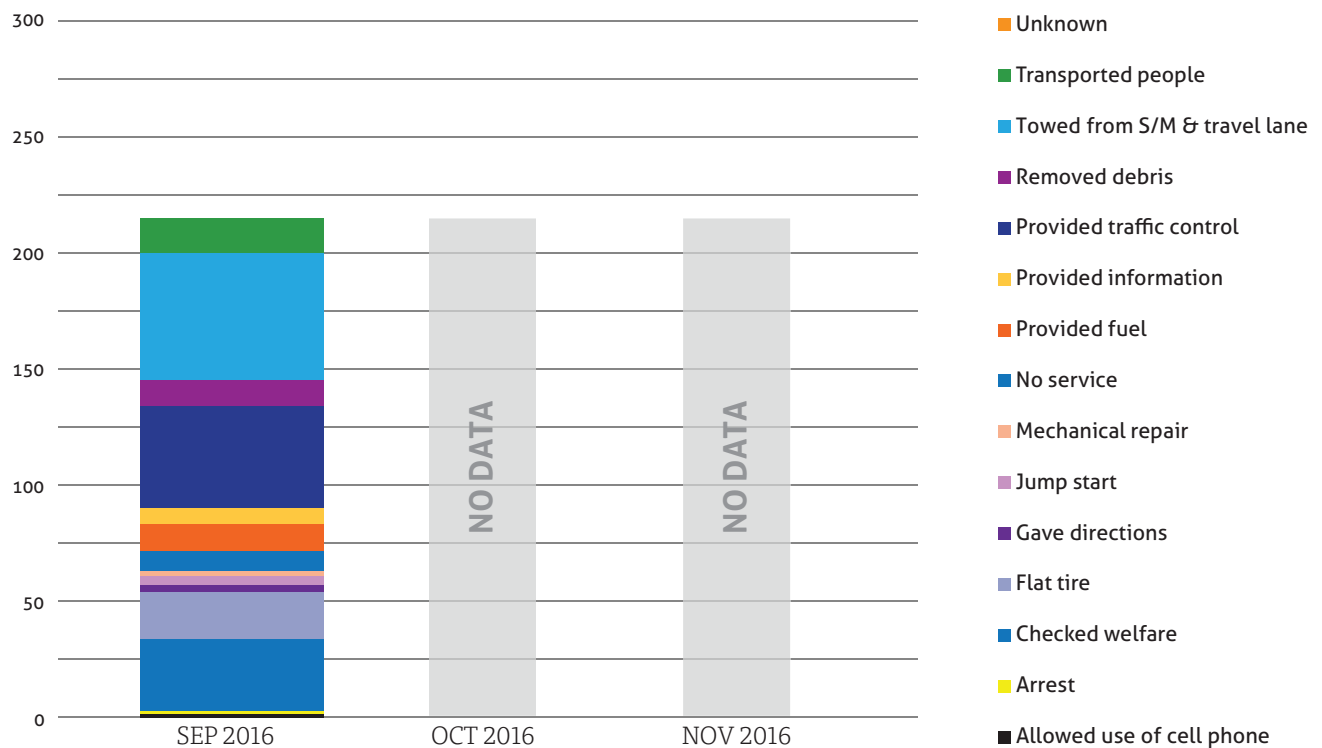
## WEBSITE STATISTICS

### WEBSITE TRAFFIC (NOVEMBER 2016)



## FREEWAY SERVICE TEAM (NOVEMBER 2016)\*

### TYPES OF SERVICES PROVIDED BY FST



	SEP 2016	OCT 2016	NOV 2016
Hours Patrolled	397	—	—
Assists	126	—	—
Avg Assists per Hour	0.32	—	—
Avg Response Time (min)	17	—	—
Avg Lane Clear Time (min)	18	—	—
Avg Assist Duration (min)	31	—	—

\* October and November 2016 data for the FST is not available.

# CALENDAR OF EVENTS (NOVEMBER 2016)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	<b>1</b> <ul style="list-style-type: none"> <li>By 5 a.m. - I-41/894 NB right lane long-term closure reopened (restored to three lanes); Zoo Interchange S-E system ramp decision point shifted to Greenfield Ave; Zoo Interchange S-W system ramp switched to a right-hand exit</li> <li>By 5 a.m. - WIS 100 entrance ramp to I-43 NB and National Ave entrance ramp to I-41/894 NB (long-term ramp closure reopened)</li> <li>By 5:30 a.m. - Greenfield Ave entrance ramp to I-41/894 NB (long-term closure reopened; only able to go to Zoo Interchange S-E system ramp/I-94 EB)</li> <li>3 p.m.-4:05 p.m. - Bluemound Rd EB at Bishop Way (right lane closed); Bluemound Rd WB at Elm Grove Rd (left lane closed)</li> <li>6:23 p.m.-6:37 p.m. - I-94 WB at 84th St (lanes affected unknown)</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>RAIN EVENT/THUNDERSTORM 5 a.m.- 10 p.m. - 0.52 inches of rain recorded at General Mitchell Airport</li> <li>5:25 a.m.-6:42 a.m. - I-94 WB at Curtis Rd (two right lanes closed)</li> <li>7:34 a.m.-7:53 a.m. - I-94 EB at Moorland Rd (lanes affected unknown)</li> <li>11:50 a.m.-12:55 p.m. - Zoo Interchange E-W system ramp (lanes affected unknown)</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>By 3 p.m. - Watertown Plank Rd EB entrance ramp to I-41 NB/SB (opened to two lanes)</li> <li>By 3 p.m. - Watertown Plank Rd WB entrance ramp to I-41 NB/SB (opened to two lanes)</li> <li>6:54 p.m.-8:42 p.m. - I-94 EB at 84th St (lanes affected unknown)</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Overnight - I-41/894 SB between the Zoo Interchange core and Greenfield Ave and Zoo Interchange W-S system ramp (traffic switch)</li> </ul>
<b>7</b> <ul style="list-style-type: none"> <li>2016 DAYLIGHT SAVING TIME ENDED by Sun, 11/6 @ 2:00 a.m.</li> <li>5:44 a.m.-6:32 a.m. - I-41 NB at North Ave entrance ramp (lanes affected unknown)</li> <li>7:39 a.m.-8:22 a.m. - I-94 WB at Hawley Rd (lanes affected unknown)</li> </ul>	<b>8</b> <ul style="list-style-type: none"> <li>US ELECTION DAY</li> <li>RAIN EVENT 7 a.m.-8 a.m. - Trace amounts of rain recorded at General Mitchell Airport</li> <li>2:55 p.m.-3:15 p.m. - I-94 EB at Curtis Rd (right lane closed)</li> <li>5:29 p.m.-6:49 p.m. - I-94 EB at Milwaukee/Waukesha county line (left lane closed)</li> </ul>	<b>9</b> <ul style="list-style-type: none"> <li>Overnight - I-94 EB off-ramp to WIS 100 (traffic switch; decision point shifted to the west at Elm Grove Rd)</li> </ul>	<b>10</b> <ul style="list-style-type: none"> <li>9:26 a.m.-10:07 a.m. - Zoo Interchange W-E system ramp (lanes affected unknown)</li> <li>Overnight - I-41/894 SB at Cleveland Ave (traffic switch)</li> </ul>	<b>11</b> <ul style="list-style-type: none"> <li>5:21 a.m.-6:24 a.m. - I-41 SB at Lincoln Ave (lanes affected unknown)</li> <li>By 5:30 a.m. - North Ave entrance ramp to I-41 NB (long-term lane closure reopened)</li> <li>By 6 a.m. - Curtis Rd NB/SB at I-94 (reopened to two lanes each direction)</li> <li>Overnight - I-41/894 SB between Greenfield Ave and National Ave (traffic switch)</li> </ul>
<b>14</b>	<b>15</b> <ul style="list-style-type: none"> <li>3:41 p.m.-5:18 p.m. - I-94 EB at WIS 100 (two left lanes closed)</li> <li>5:40 p.m.-7:33 p.m. - I-94 EB at WIS 100 (right lane closed)</li> </ul>	<b>16</b> <ul style="list-style-type: none"> <li>1:45 p.m.-2:36 p.m. - I-41 NB at off-ramp to Watertown Plank Rd (lanes affected unknown)</li> </ul>	<b>17</b> <ul style="list-style-type: none"> <li>8:30 a.m.-8:45 a.m. - Zoo Interchange W-E system ramp (lanes affected unknown)</li> <li>1:31 p.m.-2:26 p.m. - I-94 WB at 84th St (lanes affected unknown)</li> <li>Overnight - I-41 NB off-ramp to Watertown Plank Rd (traffic switch)</li> </ul>	<b>18</b> <ul style="list-style-type: none"> <li>DEER HUNTING SEASON OPEN Sat, 11/19</li> <li>5:55 p.m.-7:33 p.m. - I-94 EB at WIS 100 (right lane closure)</li> <li>RAIN EVENT 11 p.m.-midnight - Trace amounts of rain recorded at General Mitchell Airport</li> </ul>
<b>21</b> <ul style="list-style-type: none"> <li>10:29 a.m.-11:31 a.m. - I-41 NB at Bluemound Rd (left lane closed)</li> </ul>	<b>22</b> <ul style="list-style-type: none"> <li>By 5 a.m. - I-94 EB right lane (long-term closure reopened)</li> <li>RAIN EVENT 11 p.m.-midnight - Trace amounts of rain recorded at General Mitchell Airport</li> </ul>	<b>23</b> <ul style="list-style-type: none"> <li>RAIN EVENT Midnight-8 p.m. - 0.19 inches of rain recorded at General Mitchell Airport</li> <li>6:45 p.m.-7:25 p.m. - I-94 EB at WIS 100 (lanes affected unknown)</li> </ul>	<b>24</b> <ul style="list-style-type: none"> <li>THANKSGIVING</li> </ul>	<b>25</b> <ul style="list-style-type: none"> <li>BLACK FRIDAY</li> <li>RAIN EVENT Midnight-2 a.m. - Trace amounts of rain recorded at General Mitchell Airport</li> <li>12:17 p.m.-1:34 p.m. - Zoo Interchange W-E system ramp (left lane closed)</li> </ul>
<b>28</b> <ul style="list-style-type: none"> <li>RAIN EVENT All day and night - 1.08 inches of rain recorded at General Mitchell Airport</li> <li>5:53 p.m.-6:03 p.m. - I-94 EB at WIS 100 (lanes affected unknown)</li> </ul>	<b>29</b>	<b>30</b> <ul style="list-style-type: none"> <li>RAIN EVENT 3 p.m.-midnight - Trace amounts of rain recorded at General Mitchell Airport</li> </ul>		

■ Lane closure

■ Weather

■ Special events

■ Recorded incidents



## CONTACT / CONNECT



EMAIL: [zooicteam@gmail.com](mailto:zooicteam@gmail.com)



WEB: [www.zoointerchange.wi.gov](http://www.zoointerchange.wi.gov)



FACEBOOK: [www.facebook.com/wizoointerchange](http://www.facebook.com/wizoointerchange)



TWITTER: [twitter.com/WIZoolC](https://twitter.com/WIZoolC)



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